

A historical timeline of research efforts to implement mechanized pear harvest in California

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Abstract

Efforts to implement mechanized harvesting in California pear orchards have historically been motivated by actual short- or anticipated long-term labor shortages and other factors that increase labor costs. The Bracero Program brought in Mexican migrant labor in 1942 and was extended biannually via Public Law (PL) 78 from 1951 through 1964. Tree fruit harvest mechanization research programs that were initiated by the mid-1950s were of two major types: fully mechanized (e.g., knocking, shaking) and labor-assist (“man-positioning”) systems designed to increase worker productivity and reduce needs for labor. The advent of bulk bins, fork lifts and brush mowers facilitated engineering design and enabled once-over harvest and machine topping and hedging to create “fruit walls” in tree canopies ideal for platform picking. Pear fruit sensitivity to bruising eventually guided research toward the labor-assist strategy, where research thrust remains today. As the end of PL 78 loomed, University and USDA engineers, horticulturists, post harvest specialists, economists, and extensionists were enlisted to both test existing commercial machines and develop new ones. From 1960 through 1969, grower-, commercial- and university-built machines were developed and tested side by side with the goal to simulate “short reach” picking from the ground with the least investment in equipment. Generally, (1) inexperienced workers could successfully harvest from platforms; (2) multi-level, multi-worker platforms were preferred over single-worker towers; (3) productivity of platform workers was 5-50% higher than in less experienced ladder crews, but lower than in very experienced crews; and importantly, (4) continuous hedgerow “fruiting walls” 1.7-2 m wide were found necessary to achieve high platform efficiencies when tree height was mitigated by multiple platform levels. Major efforts were reduced by the mid-1970s as the labor supply stabilized. Trialed platforms were either abandoned or used strictly for pruning or cutting fire blighted shoots and platforms were not

permanently adopted commercially in California. Efforts resumed in 2006 as concerns grew about availability of authorized workers, increased enforcement of the employer obligation to verify employee eligibility, dim prospects for revision of immigration policies and labor market competition from non-agricultural sectors.